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GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
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LEONARD K. PETERS
SECRETARY

FACT SHEET

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE TREATED WASTEWATER
INTO WATERS OF THE COMMONWEALTH

KPDES No.: KY0072231 **Permit Writer:** Sara Beard **Date:** June 9, 2009
AI No.: 2956

1. SYNOPSIS OF APPLICATION

a. Name and Address of Applicant

Gerdau Ameristeel US Inc.
P.O. Box 468
Calvert City, Kentucky 42029

b. Facility Location

Gerdau Ameristeel US Inc.
1035 Shar-Cal Road
Calvert City, Marshall County, Kentucky

c. Description of Applicant's Operation

Gerdau Ameristeel is a carbon steel hot rolling mill (SIC Code 3312).

d. Production Capacity of Facility

1,870,864 lbs/day – Hot Forming Process

e. Description of Existing Pollution Abatement Facilities

Outfall 001 - Process, cooling (contact and non-contact), filter backwash, and sanitary (internal Outfall 002) wastewaters and stormwater runoff are treated in the settling clarifier prior to discharge.

Outfall 002 - Internal monitoring point for the sanitary wastewaters prior to discharge through Outfall 001.

Outfall 003 - No treatment of stormwater runoff.

f. Permitting Action

This permitting action involves a reissuance of a minor KPDES permit for a new source carbon steel mill.

2. RECEIVING WATERS

a. Receiving Water Name

Outfall 001 discharges to the Tennessee River at latitude 37°03′12″ longitude 88°23′51″. Outfall 002 is an internal outfall to 001.

Outfall 003 discharges to an unnamed tributary to Little Cypress Creek at latitude 37°02′52″ longitude 88°23′30″.

b. Stream Segment Use Classifications

This segment of the Tennessee River is classified as a Warmwater Aquatic Habitat, Primary Contact Recreation, Secondary Contact Recreation, and Outstanding State Resource Water.

The unnamed tributary to Little Cypress Creek is classified as a Warmwater Aquatic Habitat, Primary Contact Recreation, Secondary Contact Recreation, and Domestic Water Supply.

c. Stream Segment Antidegradation Categorization

The Tennessee River and unnamed tributary to Little Cypress Creek are categorized as High Quality Waters.

d. Stream Low Flow Condition

At the point of discharge the 7Q10 and the Harmonic Mean for the Tennessee River are 5,000 cfs and 40,283 cfs, respectively.

At the point of discharge the 7Q10 and the Harmonic Mean for the unnamed tributary to Little Cypress Creek are 0.0 cfs and 0.0 cfs, respectively.

3. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 001 - Process, cooling (contact and non-contact), filter backwash, and sanitary (internal Outfall 002) wastewaters and stormwater runoff are treated in the settling clarifier prior to discharge.

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	0.070	0.190	Report	Report	401 KAR 5:065, Section 2(8)
Hardness (as mg/l $CaCO_3$)	113	121	Report	Report	401 KAR 5:065, Section 2(8)
Total Suspended Solids (lbs/day)	8.87	18.60	37.3	94.0	401 KAR 5:065, Sections 4 and 5 401 KAR 10:031, Section 4 401 KAR 5:045, Sections 2 and 3 401 KAR 5:080, Section 1(2)(c)2
Oil & Grease (lbs/day)	N/R	6.23	N/A	20.4	401 KAR 5:065, Sections 4 and 5
Temperature (^oF)	65.0	37.7	95.0	100.0	401 KAR 10:031, Section 4(1) 401 KAR 10:029, Section 4 401 KAR 5:080, Section 1(2)(c)
Total Recoverable Metals (mg/l)	0.07	0.09	Report	Report	401 KAR 5:065, Section 2(8)
Acute Toxicity (TU_a)	N/R	1.25	N/A	5.19	401 KAR 10:029, Section 5
pH (standard units)	6.0(min)	8.2(max)	6.0(min)	9.0(max)	401 KAR 5:065, Sections 4 and 5 401 KAR 10:031, Section 4

The data contained under the reported discharge columns is from the analysis of the Discharge Monitoring Reports (DMRs) data that has been reported during the term of the current permit.

The term Total Recoverable Metals means those metals listed on Form C, Section V, Part C – Metals, Cyanide, and Total Phenols: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc.

The abbreviations N/R and N/A mean not reported on the Discharge Monitoring Report (DMR) and not applicable, respectively.

4. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 001 - Process, cooling (contact and non-contact), filter backwash, and sanitary (internal Outfall 002) wastewaters and stormwater runoff are treated in the settling clarifier prior to discharge.

b. Effluent Characteristics

Flow	Hardness	Total Suspended Solids
Oil & Grease	Temperature	Total Recoverable Metals
Acute Toxicity	pH	

c. Pertinent Factors

The hot rolling wastewaters are subject to the "New Source Performance Standards" (NSPS) requirements of the Hot strip and sheet mills, carbon and specialty Subsection of the Flat mills Section of Subpart G – Hot Forming Subcategory of the Iron and Steel Manufacturing Point Source Category (40 CFR 420.74).

Gerdau Ameristeel requested a mixing zone for Acute Toxicity and Temperature at this outfall. After review of the multi-port diffuser information submitted by the permittee, the Division of Water has determined that two different mixing zones will be granted for Acute Toxicity and Temperature. The physical description of both mixing zones can be found in Section 11 of this Fact Sheet.

A summarization of the effluent guidelines, water quality standards, assumptions, and calculations can be found in Attachment A – Regulatory Requirements.

A summarization of the toxicity and thermal mixing zone models can be found in Fact Sheet Attachment B – CORMIX Diffuser Model – Toxicity and Fact Sheet Attachment C – CORMIX Diffuser Model – Temperature, respectively.

d. Monitoring Requirements

Flow shall be monitored instantaneously twice per month.

pH shall be monitored once per day by grab sample.

Hardness, Total Suspended Solids, Oil & Grease, Temperature, and pH shall be monitored twice per month by grab sample.

Total Recoverable Metals shall be monitored once per quarter by grab sample. The results of the analyses shall be total and reported as a single concentration on the DMR. The laboratory bench sheets showing the results for each metal shall be attached to the DMR.

Acute Toxicity shall be monitored once per quarter by a minimum of two (2) grab samples collected over a 24-hour period as descriped in Part IV of the Permit.

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Flow, Hardness, and Total Recoverable Metals
The monitoring requirements for these parameters are consistent with the requirements of 401 KAR 5:065, Section 2(8).

4. METHODOLOGY USED IN DETERMINING LIMITATIONS - continued

e. Justification of Limits - continued

Total Suspended Solids
The limits for this parameter are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5, 401 KAR 10:031, Section 4, 401 KAR 5:045, Sections 2 and 3, and 401 KAR 5:080, Section 1(2)(c)2. These limits are representative of the "New Source Performance Standards" (NSPS) requirements of the Hot Forming Subcategory of the Iron and Steel Manufacturing Point Source Category (40 CFR 420.74). Section 4 of 10:031 establishes water quality criteria for the protection of Kentucky's waters. Sections 2 and 3 of 5:045 require biochemically degradable wastewaters to receive secondary treatment. Section 1(2)(c)2 of 401 KAR 5:080 represents Division of Water's "Best Professional Judgement" (BPJ) determination of the allowable contribution of TSS to the final effluent limit from the stormwater runoff and filter backwash wastestreams.

Oil & Grease
The limits for this parameter are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5. This limit is representative of the "New Source Performance Standards" (NSPS) requirements of the Hot Forming Subcategory of the Iron and Steel Manufacturing Point Source Category (40 CFR 420.74).

Temperature
The limits for this parameter are consistent with the requirements of 401 KAR 10:031, Section 4, 401 KAR 10:029, Section 4, and 401 KAR 5:080, Section 1(2)(c)2.

Acute Toxicity
The requirements for this parameter are consistent with the requirements of 401 KAR 10:031, Section 4.

pH
The limits for this parameter are consistent with the requirements of 401 KAR 10:031, Section 4 (Kentucky Water Quality Standards) and 401 KAR 5:065, Sections 4 and 5. These limits are representative of the "New Source Performance Standards" (NSPS) requirements of the Hot Forming Subcategory of the Iron and Steel Manufacturing Point Source Category (40 CFR 420.74).

5. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 002 – Internal monitoring point for the sanitary wastewaters prior to discharge through Outfall 001.

Effluent Characteristics	Reported Discharge Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
Flow (MGD)	0.0003	0.001	Report	Report	401 KAR 5:065, Section 2(8)
BOD_5 (mg/l)	6.24	6.24	30	45	401 KAR 10:031, Section 4 401 KAR 5:045, Sections 3 and 5
Total Suspended Solids (mg/l)	5.74	5.78	30	45	401 KAR 10:031, Section 4 401 KAR 5:045, Sections 2 and 3
Escherichia Coli (N/100 ml)	N/R	N/R	130	240	401 KAR 10:031, Section 7 401 KAR 5:045, Section 4 401 KAR 5:080, Section 1(2)(c)2
Fecal Coliform Bacteria (N/100 ml)	5.71	11.03	Removing from Permit		401 KAR 5:080, Section 1(2)(c)2
Ammonia Nitrogen (as mg/l N)	1.14	1.29	20	30	401 KAR 10:031, Section 4
Dissolved Oxygen (mg/l) (minimum)	6.7	N/A	Not less than 2.0		401 KAR 10:031, Section 4 401 KAR 5:045, Sections 3 and 5
pH (standard units)	6.8	8.0	6.0 (min)	9.0 (max)	401 KAR 10:031, Section 4 401 KAR 5:045, Section 4

The data contained under the reported discharge columns is not from the renewal application, but rather from the analysis of the DMR data that has been reported during the term of the previous permit.

The abbreviation BOD_5 means Biochemical Oxygen Demand (5-day).

The abbreviations N/R and N/A mean not reported on the Discharge Monitoring Report (DMR) and not applicable, respectively.

The effluent limitations for BOD_5 and Total Suspended Solids are Monthly Averages and Weekly Averages.

The effluent limitations for *Escherichia Coli* are 30 day and 7 day Geometric Means.

The data contained under the reported discharge columns is from the analysis of the Discharge Monitoring Reports (DMRs) data that has been reported during the term of the current permit.

6 METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 002 – Internal monitoring point for the sanitary wastewaters prior to discharge through Outfall 001.

b. Effluent Characteristics

Flow	Biochemical Oxygen Demand (5-day)
Total Suspended Solids	*Escherichia Coli*
Dissolved Oxygen	pH
Ammonia Nitrogen	Fecal Coliform Bacteria

c. Pertinent Factors

On September 8, 2004 Kentucky's revised water quality standards, 401 KAR 10:031 became effective.

d. Monitoring Requirements

Flow shall be monitored instantaneously once per month.

Ammonia Nitrogen, Biochemical Oxygen Demand (5-day), Total Suspended Solids, *Escherichia Coli*, pH, Dissolved Oxygen and Total Residual Chlorine shall be monitored once per month by grab sample.

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Internal Monitoring Requirement
Section 3(8) of 401 KAR 5:065 authorizes the establishment of internal monitoring points to ensure compliance with applicable treatment requirements, which when commingling with other wastestreams will prevent measuring compliance.

Escherichia Coli and Fecal Coliform Bacteria
The limits for *Escherichia Coli* are consistent with the requirements of 401 KAR 10:031, Section 7, 401 KAR 5:045 Section 4 and 401 KAR 5:080, Section 1(2)(c) 2. Although Fecal Coliform Bacteria has been used as an indicator of fecal contamination, it does contain other species that are not necessarily fecal in origin. EPA recommends *Escherichia Coli*, which is specific to fecal material from warm-blooded animals, as the best indicator of health risk from contact with recreational waters. Therefore, it is the "Best Professional Judgment "BPJ" of the Division of Water that *Escherichia Coli* be used in place of Fecal Coliform Bacteria on this permit.

Flow
The monitoring requirements for this parameter are consistent with the requirements of 401 KAR 5:065, Section 2(8).

BOD_5, Ammonia Nitrogen, and Dissolved Oxygen
The limits for these parameters are consistent with the requirements of 401 KAR 10:031, Section 4, and 401 KAR 5:045, Sections 3 and 5. Section 4 of 10:031 establishes water quality criteria for the protection of Kentucky's waters.

6 METHODOLOGY USED IN DETERMINING LIMITATIONS – continued

e. Justification of Limits - continued

Total Suspended Solids
The limits for this parameter are consistent with the requirements of 401 KAR 10:031, Section 4 and 5:045, Sections 2 and 3. Section 4 of 10:031 establishes water quality criteria for the protection of Kentucky's waters. Sections 2 and 3 of 5:045 require biochemically degradable wastewaters to receive secondary treatment.

pH
The limits for these parameters are consistent with the requirements of 401 KAR 10:031, Section 4 and 5:045, Section 4. Section 4 of 10:031 establishes water quality criteria for the protection of Kentucky's waters. Section 4 of 5:045 establishes the acceptable levels of these parameters for biochemically degradable wastewaters.

7. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 003 – No treatment of stormwater runoff.

Effluent Characteristics	Reported Discharge Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
Flow (MGD)	0.30	1.28	Report	Report	401 KAR 5:065, Section 2(8)
Precipitation (inches)	0.14	1.27	Report	Report	401 KAR 5:065, Section 2(8)
Hardness (as mg/l $CaCO_3$)	105	105	Report	Report	401 KAR 5:065, Section 2(8)
Total Suspended Solids (mg/l)	16.5	17.1	Report	Report	401 KAR 5:065, Section 2(8)
Oil & Grease (mg/l)	5.3	5.3	Report	Report	401 KAR 5:065, Section 2(8)
Total Recoverable Metals (mg/l)	0.07	0.08	Report	Report	401 KAR 5:065, Section 2(8)
pH (standard units)	6.7	8.0	Report	Report	401 KAR 5:065, Section 2(8)

The term Total Recoverable Metals means those metals listed on Form C, Section V, Part C – Metals, Cyanide, and Total Phenols: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc.

The data contained under the reported discharge columns is from the analysis of the Discharge Monitoring Reports (DMRs) data that has been reported during the term of the current permit.

8 METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 003 – No treatment of stormwater runoff.

b. Effluent Characteristics

Flow	Precipitation
Hardness	Total Suspended Solids
Oil & Grease	pH
Total Recoverable Metals	

c. Pertinent Factors

None

d. Monitoring Requirements

Flow shall be monitored instantaneously once per month.

Precipitation, Hardness, Total Suspended Solids, Oil & Grease, and pH shall be monitored once per month by grab sample.

Total Recoverable Metals shall be monitored once per quarter by grab sample. The results of the analyses shall be total and reported as a single concentration on the DMR. The laboratory bench sheets showing the results for each metal shall be attached to the DMR.

e. Justification of Conditions

The Kentucky regulations cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes.

Flow, Precipitation, Hardness, Total Suspended Solids, Oil & Grease, pH, and Total Recoverable Metals
The monitoring requirements for these parameters are consistent with the requirements of 401 KAR 5:065, Section 2(8).

9. ANTIDEGRADATION

The development of this permit commenced prior to the April 12, 2005 EPA approval of Kentucky's Antidegradation Regulation promulgated on September 8, 2004. Therefore, previous antidegradation requirements are applicable. The conditions of 401 KAR 10:029, Section 1 have been satisfied by this permit action. A review under 401 KAR 10:030 Section 1 is not applicable.

10. PROPOSED COMPLIANCE SCHEDULE FOR ATTAINING EFFLUENT LIMITATIONS

Permittee shall comply with the effluent limitations by the effective date of the permit.

11. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGE

Best Management Practices (BMP) Plan
Pursuant to 401 KAR 5:065, Section 2(10), a BMP requirement shall be included: to control or abate the discharge of pollutants from ancillary areas containing toxic or hazardous substances or those substances which could result in an environmental emergency; where numeric effluent limitations are infeasible; or to carry out the purposes and intent of KRS 224. The facility has several areas where support activities occur which have a potential of the discharge of such substances through storm water runoff or spillage. Some of these areas will drain to present wastewater treatment plants, others will not.

11. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGE - continued

Cooling Water Additives, FIFRA, and Mollusk Control

The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in cooling water which ultimately may be released to the waters of the Commonwealth is prohibited, except Herbicides, unless specifically identified and authorized by the KPDES permit. In the event the permittee needs to use a biocide or chemical not previously reported for mollusk control or other purpose, the permittee shall submit sufficient information, a minimum of thirty (30) days prior to the commencement of use of said biocides or chemicals, to the Division of Water for review and establishment of appropriate control parameters. Such information requirements shall include:

1. Name and general composition of biocide or chemical,
2. Any and all aquatic organism toxicity data,
3. Quantities to be used,
4. Frequencies of use,
5. Proposed discharge concentrations, and
6. EPA registration number, if applicable.

Outfall Signage

As a member of ORSANCO (Ohio River Valley Sanitation Commission) the Commonwealth of Kentucky through the Division of Water implements a requirement that the permittee post a permanent marker at each discharge point to the Ohio River. It is the Best Professional Judgment of the Division of Water, 401 KAR 5:080, Section 1(2)(c)2, that all permittees post a marker at all discharge locations and/or monitoring points. The ORSANCO requirements for the marker specify it to be at least 2 feet by 2 feet in size and a minimum of 3 feet above ground level with the Permittee Name and KPDES permit and outfall numbers in 2 inch letters. For internal monitoring points the marker shall be of sufficient size to include the outfall number in 2 inch letters and is to be posted as near as possible to the actual sampling location.

Mixing Zone

Gerdau Ameristeel has requested a mixing zone in the vicinity of the proposed discharge for Toxicity and Temperature. Pursuant to the requirements of 401 KAR 10:029, Section 4(6) an assigned mixing zone can not exceed 1/3 of the width of the receiving water body in a spatial direction. At the proposed point of discharge the width of the Tennessee River is 1640 feet (500 meters) therefore an assigned mixing zone for these pollutants can not exceed 400 feet in a spatial direction. In accordance with the requirements of 401 KAR 10:029, Section 4(1) the mixing zones shall have the following dimensions:

Toxicity:

Linear Distance from Point of Discharge:	0.033 feet in any direction
Maximum Surface Area Involved:	8.56×10^{-4} square feet
Volume of Receiving Water:	500 cfs (323 MGD)

Temperature:

Linear Distance from Point of Discharge:	0.0056 feet in any direction
Maximum Surface Area Involved:	2.47×10^{-5} square feet
Volume of Receiving Water:	500 cfs (323 MGD)

12. PERMIT DURATION

Five (5) years. This facility is in the Four Rivers, Upper & Lower Cumberland Unit as per the Kentucky Watershed Management Framework.

13. PERMIT INFORMATION

The application, draft permit fact sheet, public notice, comments received, and additional information is available by writing the Division of Water at 200 Fair Oaks Lane, Frankfort, Kentucky 40601.

14. REFERENCES AND CITED DOCUMENTS

All material and documents referenced or cited in this fact sheet are, a part of the permit information as described above and are readily available at the Division of Water Central Office. Information regarding these materials may be obtained from the person listed below.

15. CONTACT

For further information contact the individual identified on the Public Notice or the Permit Writer – Sara Beard at (502) 564-3410, extension 4925 or e-mail Sara.Beard@ky.gov.

16. PUBLIC NOTICE INFORMATION

Please refer to the attached Public Notice for details regarding the procedures for a final permit decision, deadline for comments, and other information required by 401 KAR 5:075, Section 4(2)(e).

ATTACHMENT A - REGULATORY REQUIREMENTS

EFFLUENT GUIDELINES

The facility is a "New Source" subject to the requirements of Subpart G of 40 CFR Part 420 - Iron and Steel Manufacturing Point Source Category. Specifically, the "New Source Performance Standards" (NSPS) for the Hot strip and sheet mills, carbon and specialty Subsection of the Flat mills Section of the Hot Forming Subcategory (40 CFR 420.74).

PART 420 — IRON AND STEEL MANUFACTURING POINT SOURCE CATEGORY

Subpart G — Hot Forming Subcategory

Subsection 420.70 – Applicability; description of the hot forming subcategory

The provisions of this subpart are applicable to discharges and to the introduction of pollutants into publicly owned treatment works resulting from hot forming operations conducted in primary, section, flat, and pipe and tube mills

Subsection 420.74 – New Source Performance Standards (NSPS)

The discharge of wastewater pollutants from any new source subject to this subpart shall not exceed the standards set forth below.

(c) Flat mills — (1) Hot strip and sheet mills, carbon and specialty.

Subpart G

Pollutant or pollutant property	NSPS effluent limitations	
	Maximum for any 1 day	Average of daily values for 30 consecutive days
	Kg/kkg (pounds per 1,000 lb) of products	
TSS	0.0435	0.0163
O&G	0.0109	
pH	Within the range of 6.0 to 9.0 at all times	

401 KAR 5:045, Section 3 – Secondary Treatment – for Sanitary Wastewaters (internal Outfall 002) that discharge at Outfall 001

Pollutant or Pollutant Characteristic	Maximum Concentration (mg/l)	Average Concentration (mg/l)
Total Suspended Solids	45	30

401 KAR 5:080, SECTION 1(2)(c)2 – Best Professional Jugement – for loadings in Storm Water Runoff and Filter Back Water that discharge at Outfall 001

Pollutant or Pollutant Characteristic	Maximum Loading (lbs/day)	Average Loading (lbs/day)
Total Suspended Solids	10	5

Limits Calculation

EFFLUENT GUIDELINES

The final effluent limitations required by the effluent guidelines are a summation of the component contributions.

The following formulas where used to calculate the contribution from each source:

$$\text{Monthly Average} = \sum \left[(\text{Production Rate}) \text{ x } (\text{Monthly Average Factor}) \right]$$

$$\text{Daily Maximum} = \sum \left[(\text{Production Rate}) \text{ x } (\text{Daily Maximum Factor}) \right]$$

The following tables are a summarization of these calculations.

Pollutant or pollutant property	40 CFR 420.74 – NSPS – Hot Forming ($1{,}870.864 * 10^3$ lbs/day)	
	Daily Maximum (lbs/day)	Monthly Average (lbs/day)
Total Suspended Solids	81.383	30.495
Oil & Grease	20.392	N/A

SECONDARY TREATMENT

Sanitary Wastewater Component:
Monthly Average = Design Flow (MGD) x 8.345 x Secondary Treatment Monthly Average (mg/l)
Daily Maximum = Design Flow (MGD) x 8.345 x Secondary Treatment Daily Maximum (mg/l)

Design Flow = 0.007 MGD

Pollutant or Pollutant Characteristic	Maximum Concentration (lbs/day)	Average Concentration (lbs/day)
Total Suspended Solids	2.6	1.8

BEST PROFESSIONAL JUGEMENT

Pollutant or Pollutant Characteristic	Maximum Concentration (lbs/day)	Average Concentration (lbs/day)
Total Suspended Solids	10	5

TOTAL LIMITS - Outfall 001

Pollutant or pollutant property	Total Limits - 001	
	Daily Maximum (lbs/day)	Monthly Average (lbs/day)
Total Suspended Solids	94.0	37.3
Oil & Grease	20.4	N/A

ATTACHMENT B
CORMIX Diffuser Model – Toxicity

CORMIX2 PREDICTION FILE:

```
                    CORMIX MIXING ZONE EXPERT SYSTEM
         Subsystem CORMIX2:  Multiport Diffuser Discharges
                       CORMIX Version 5.0GT
                   HYDRO2 Version 5.0.0.0 March 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:   Gerdau Ameristeel KY0072231
 Design case:       Outfall 001 Toxicity
 FILE NAME:         C:\...Files\CORMIX 5.0_TEST\MyFiles\Gerdau toxicity.prd
 Time stamp:        Tue Jun  9 10:31:01 2009

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    500.00  AS    =   1760.00  QA    =    161.92  ICHREG= 1
 HA    =      3.52  HD    =      4.57
 UA    =     0.092  F     =     0.046 USTAR =0.7009E-02
 UW    =     2.000 UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U         RHOAM =  997.0456

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= unidirectional_perpendicular
 BANK  =  LEFT      DISTB =      6.09  YB1   =      3.05  YB2   =      9.14
 LD    =      6.10  NOPEN =    3       SPAC  =      3.05
 D0    =     0.050  A0    =     0.002  H0    =      3.05  SUB0  =      1.52
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =     90.00  THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.751  Q0    =     0.004       =0.4425E-02
 RHO0  =  995.3405  DRHO0 =0.1705E+01  GP0   =0.1677E-01
 C0    =0.5190E+01  CUNITS=  TUa
 IPOLL =  1         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.7254E-03  m0    =0.5450E-03  j0    =0.1217E-04  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001  lM    =      1.03  lm    =      0.06
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.4425E-02  M0    =0.3324E-02  J0    =0.7421E-04
 Associated 3-d length scales (meters)
 LQ    =      0.04  LM    =      1.61  Lm    =      0.63  Lb    =      0.10
                                        Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =    186.67  FRD0  =     25.94  R     =      8.17  PL    =    140.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR RISER GROUPS:
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.751  D0    =     0.050  A0    =     0.002  THETA =      0.00
 FR0   =    186.67  FRD0  =     25.94  R     =      8.17
 (slot)             (riser group)

FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    IMPU7  2
 2  Applicable layer depth HS =     4.57  2
```

2
CORMIX2 PREDICTION FILE:

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MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.5190E+01  CUNITS=  TUa
 NTOX  =  1         CMC   =0.1000E+01  CCC   =  CSTD
 NSTD  =  1         CSTD  =0.1000E+01
 REGMZ =  0
 XINT  =   5000.00  XMAX  =   5000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
         6.09 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 800 display intervals per module
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C        BV       BH
     0.00     0.00    3.05     1.0 0.519E+01   0.00     3.05

END OF MOD201: DIFFUSER DISCHARGE MODULE
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =    4.57m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)

       X        Y       Z        S       C        BV       BH
     0.00     0.00    3.05     1.0 0.519E+01   0.00     3.05
** CMC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below CMC value of 0.100E+01
   in the current prediction interval.
 This is the extent of the TOXIC DILUTION ZONE.
** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below water quality standard
   or CCC value of 0.100E+01 in the current prediction interval.
 This is the spatial extent of concentrations exceeding the water quality
   standard or CCC value.
     0.00     0.00    3.05    21.6 0.240E+00   0.01     3.05
     0.01     0.00    3.05    30.1 0.172E+00   0.01     3.05
     0.01     0.00    3.04    36.7 0.141E+00   0.02     3.05
.
.
.
```

CORMIX2 PREDICTION FILE:

```
      3.04     0.00    2.29   582.9 0.890E-02   4.56     3.03
      3.05     0.00    2.29   583.3 0.890E-02   4.56     3.03
      3.05     0.00    2.28   583.6 0.889E-02   4.57     3.03
 Cumulative travel time =          32.6947 sec
   Plume centerline may exhibit slight discontinuities in transition
     to subsequent far-field module.

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER
------------------------------------------------------------------------------
------------------------------------------------------------------------------
BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

 Phase 1: Vertically mixed, Phase 2: Re-stratified

------------------------------------------------------------------------------
 Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW
------------------------------------------------------------------------------
** End of NEAR-FIELD REGION (NFR) **
------------------------------------------------------------------------------
BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)

 Plume Stage 1 (not bank attached):
       X        Y       Z        S        C        BV       BH       ZU       ZL
      3.05     0.00    4.57   583.6 0.889E-02   4.57     3.07     4.57     0.00
      3.10     0.00    4.57   583.9 0.889E-02   4.57     3.08     4.57     0.00
      3.16     0.00    4.57   584.2 0.888E-02   4.56     3.08     4.57     0.01
.
.
.
     45.59     0.00    4.57   785.5 0.661E-02   3.10     6.09     4.57     1.47
     45.64     0.00    4.57   785.8 0.661E-02   3.10     6.09     4.57     1.47
     45.69     0.00    4.57   786.0 0.660E-02   3.10     6.10     4.57     1.47
 Cumulative travel time =         496.1814 sec

------------------------------------------------------------------------------
 Plume is ATTACHED to LEFT  bank/shore.
   Plume width is now determined from LEFT  bank/shore.

 Plume Stage 2 (bank attached):
       X        Y       Z        S        C        BV       BH       ZU       ZL
     45.69     6.09    4.57   786.0 0.660E-02   3.10    12.19     4.57     1.47
     45.81     6.09    4.57   786.5 0.660E-02   3.10    12.20     4.57     1.47
     45.92     6.09    4.57   787.0 0.659E-02   3.10    12.21     4.57     1.47
.
.
.
    137.18     6.09    4.57  1322.9 0.392E-02   3.75    16.96     4.57     0.82
    137.29     6.09    4.57  1323.8 0.392E-02   3.75    16.97     4.57     0.82
    137.41     6.09    4.57  1324.7 0.392E-02   3.75    16.97     4.57     0.82
 Cumulative travel time =        1493.0807 sec
```

CORMIX2 PREDICTION FILE:

```
END OF MOD241: BUOYANT AMBIENT SPREADING
-------------------------------------------------------------------------------
 Due to the attachment or proximity of the plume tothe bottom, the bottom
   coordinate for the FAR-FIELD differs from the ambient depth, ZFB = 0 m.
 In a subsequent analysis set "depth at discharge" equal to "ambient depth".
-------------------------------------------------------------------------------
BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

  Vertical diffusivity (initial value)   = 0.647E-02 m^2/s
  Horizontal diffusivity (initial value) = 0.809E-02 m^2/s

 Profile definitions:
   BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
      = or equal to layer depth, if fully mixed
   BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
        measured horizontally in Y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

 Plume Stage 2 (bank attached):
       X        Y       Z        S        C        BV       BH       ZU       ZL
    137.41     6.09    4.57  1324.7 0.392E-02   3.75    16.97    4.57    0.82
    143.49     6.09    4.57  1365.0 0.380E-02   3.86    17.02    4.57    0.71
    149.57     6.09    4.57  1405.5 0.369E-02   3.96    17.07    4.57    0.61
    155.64     6.09    4.57  1446.1 0.359E-02   4.06    17.12    4.57    0.51
    161.72     6.09    4.57  1486.8 0.349E-02   4.16    17.17    4.57    0.41
    167.80     6.09    4.57  1527.5 0.340E-02   4.27    17.22    4.57    0.30
    173.88     6.09    4.57  1568.3 0.331E-02   4.37    17.27    4.57    0.20
    179.96     6.09    4.57  1609.0 0.323E-02   4.47    17.32    4.57    0.10
    186.03     6.09    4.57  1649.7 0.315E-02   4.57    17.37    4.57    0.00
 Plume interacts with BOTTOM.
 The passive diffusion plume becomes VERTICALLY FULLY MIXED within this
   prediction interval.
    192.11     6.09    4.57  1654.6 0.314E-02   4.57    17.41    4.57    0.00
    198.19     6.09    4.57  1659.2 0.313E-02   4.57    17.46    4.57    0.00
    204.27     6.09    4.57  1663.8 0.312E-02   4.57    17.51    4.57    0.00
.
.
.
   4987.79     6.09    4.57  3834.5 0.135E-02   4.57    40.36    4.57    0.00
   4993.87     6.09    4.57  3836.5 0.135E-02   4.57    40.38    4.57    0.00
   4999.95     6.09    4.57  3838.4 0.135E-02   4.57    40.40    4.57    0.00
 Cumulative travel time =       54345.8867 sec

 Simulation limit based on maximum specified distance =   5000.00 m.
   This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
CORMIX2: Multiport Diffuser Discharges       End of Prediction File
22222222222222222222222222222222222222222222222222222222222222222222222222
```

CORMIX2 SESSION REPORT:

```
                    CORMIX MIXING ZONE EXPERT SYSTEM
                        CORMIX Version 5.0GT
                     HYDRO2:Version  March,2007
SITE NAME/LABEL:                Gerdau Ameristeel KY0072231
  DESIGN CASE:                  Outfall 001 Toxicity
  FILE NAME:                    C:\Program Files\CORMIX 5.0 TEST\MyFiles\Gerdau
toxicity.prd
  Using subsystem CORMIX2:     Multiport Diffuser Discharges
  Start of session:             06/09/2009--10:31:01
*******************************************************************************
SUMMARY OF INPUT DATA:
-------------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                         = bounded
  Width                         BS      = 500 m
  Channel regularity            ICHREG = 1
  Ambient flowrate              QA      = 161.92 m^3/s
  Average depth                 HA      = 3.52 m
  Depth at discharge            HD      = 4.57 m
  Ambient velocity              UA      = 0.092 m/s
  Darcy-Weisbach friction factor F      = 0.0464
    Calculated from Manning's n         = 0.03
  Wind velocity                 UW      = 2 m/s
  Stratification Type           STRCND = U
  Surface temperature                   = 25 degC
  Bottom temperature                    = 25 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density               RHOAS  = 997.0456 kg/m^3
  Bottom density                RHOAB  = 997.0456 kg/m^3
-------------------------------------------------------------------------------
DISCHARGE PARAMETERS:           Submerged Multiport Diffuser Discharge
  Diffuser type                 DITYPE = unidirectional perpendicular
  Diffuser length               LD      = 6.1 m
  Nearest bank                          = left
  Diffuser endpoints            YB1     = 3.05 m;    YB2 = 9.14 m
  Number of openings            NOPEN  = 3
  Number of Risers              NRISER = 3
  Ports/Nozzles per Riser       NPPERR  = 1
  Spacing between risers/openings SPAC   = 3.05 m
  Port/Nozzle diameter          D0      = 0.05 m
    with contraction ratio              = 1
  Equivalent slot width         B0      = 0.0010 m
  Total area of openings        TA0     = 0.0059 m^2
  Discharge velocity            U0      = 0.75 m/s
  Total discharge flowrate      Q0      = 0.004425 m^3/s
  Discharge port height         H0      = 3.05 m
  Nozzle arrangement            BETYPE = unidirectional without fanning
  Diffuser alignment angle      GAMMA  = 90 deg
  Vertical discharge angle      THETA  = 0 deg
  Actual Vertical discharge angle THEAC  = 0 deg
  Horizontal discharge angle    SIGMA  = 0 deg
  Relative orientation angle    BETA   = 90 deg
  Discharge temperature (freshwater)    = 31 degC
  Corresponding density         RHO0   = 995.3405 kg/m^3
  Density difference            DRHO   = 1.7051 kg/m^3
  Buoyant acceleration          GP0    = 0.0168 m/s^2
  Discharge concentration       C0     = 5.19 TUa
  Surface heat exchange coeff.  KS     = 0 m/s
  Coefficient of decay          KD     = 0 /s
-------------------------------------------------------------------------------
```

CORMIX2 SESSION REPORT:

```
FLUX VARIABLES PER UNIT DIFFUSER LENGTH:
  Discharge (volume flux)         q0     = 0.000725 m^2/s
  Momentum flux                   m0     = 0.000545 m^3/s^2
  Buoyancy flux                   j0     = 0.000012 m^3/s^3
-------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.00 m          Lm  = 0.06 m          LM  = 1.03 m
  lm' = 99999 m         Lb' = 99999 m         La  = 99999 m
  (These refer to the actual discharge/environment length scales.)
-------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
Slot Froude number              FR0    = 186.67
  Port/nozzle Froude number       FRD0   = 25.94
  Velocity ratio                  R      = 8.17
-------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                         = yes
  CMC concentration               CMC     = 1 TUa
  CCC concentration               CCC     = 1 TUa
  Water quality standard specified        = given by CCC value
  Regulatory mixing zone                  = no
  Region of interest                      = 5000 m downstream
*******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *-------------------------*
  | FLOW CLASS   = IMPU7 |
  *-------------------------*
  This flow configuration applies to a layer corresponding to the full water
  depth at the discharge site.
  Applicable layer depth = water depth = 4.57 m
*******************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

-------------------------------------------------------------------------------
X-Y-Z Coordinate system:
  Origin is located at the bottom below the port center:
    6.09 m from the left bank/shore.
  Number of display steps NSTEP = 800 per module.
-------------------------------------------------------------------------------
NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no regulatory
  implication.  However, this information may be useful for the discharge
  designer because the mixing in the NFR is usually sensitive to the
  discharge design conditions.
  Pollutant concentration at NFR edge  c = 0.0089 TUa
  Dilution at edge of NFR              s = 583.6
  NFR Location:                        x = 3.05 m
    (centerline coordinates)           y = 0 m
                                       z = 4.57 m
  NFR plume dimensions:  half-width (bh) = 3.03 m
                          thickness (bv) = 4.57 m
Cumulative travel time:       32.695 sec.
-------------------------------------------------------------------------------
Buoyancy assessment:
  The effluent density is less than the surrounding ambient water
  density at the discharge level.
  Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
  the surface.
-------------------------------------------------------------------------------
```

CORMIX2 SESSION REPORT:

```
Near-field instability behavior:
  The diffuser flow will experience instabilities with full vertical mixing
  in the near-field.
  There may be benthic impact of high pollutant concentrations.
------------------------------------------------------------------------------
FAR-FIELD MIXING SUMMARY:
  Plume is vertically fully mixed WITHIN NEAR-FIELD (or a fraction thereof),
  but RE-STRATIFIES LATER.
  Plume becomes vertically fully mixed again at 192.11 m downstream.
------------------------------------------------------------------------------
PLUME BANK CONTACT SUMMARY:
  Plume in bounded section contacts one bank only at 45.69 m downstream.
*********************** TOXIC DILUTION ZONE SUMMARY ************************
Recall: The TDZ corresponds to the three (3) criteria issued in the USEPA
  Technical Support Document (TSD) for Water Quality-based Toxics Control,
  1991 (EPA/505/2-90-001).
  Criterion maximum concentration (CMC)  = 1  TUa
Corresponding dilution                   = 5.19
The CMC was encountered at the following plume position:
  Plume location:                      x = 0.00 m
    (centerline coordinates)           y = 0 m
                                       z = 3.05 m
  Plume dimension:       half-width (bh) = 3.05 m
                          thickness (bv) = 0.01 m
 CRITERION 1: This location is beyond 50 times the discharge length scale of
              Lq = 0.04 m.
 +++++ The discharge length scale TEST for the TDZ has FAILED. ++++++

 CRITERION 2: This location is within 5 times the ambient water depth of
              HD = 4.57 m.
 ++++++++++ The ambient depth TEST for the TDZ has been SATISFIED.++++++++++

 CRITERION 3: No RMZ has been defined.  Therefore, the Regulatory Mixing zone
              test for the TDZ cannot be applied.
 The diffuser discharge velocity is equal to 0.75 m/s.
   This is below the value of 3.0 m/s recommended in the TSD.

 *** This discharge DOES NOT SATISFY all three CMC criteria for the TDZ. ****
 **** This MAY be caused by the low discharge velocity for this design. *****
********************** REGULATORY MIXING ZONE SUMMARY **********************
No RMZ has been specified.
However:
The CCC was encountered at the following plume position:
The CCC for the toxic pollutant was encountered at the following
  plume position:
  CCC                                    = 1  TUa
Corresponding dilution                   = 5.2
  Plume location:                      x = 0.00 m
    (centerline coordinates)           y = 0 m
                                       z = 3.05 m
  Plume dimensions:      half-width (bh) = 3.05 m
                          thickness (bv) = 0.01 m
********************** FINAL DESIGN ADVICE AND COMMENTS **********************
CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent
  the actual three-dimensional diffuser geometry.  Thus, it approximates
  the details of the merging process of the individual jets from each
  port/nozzle.
In the present design, the spacing between adjacent ports/nozzles
  (or riser assemblies) is of the order of, or less than, the local
  water depth so that the slot diffuser approximation holds well.
```

CORMIX2 SESSION REPORT:

Nevertheless, if this is a final design, the user is advised to use a
final CORMIX1 (single port discharge) analysis, with discharge data
for an individual diffuser jet/plume, in order to compare to
the present near-field prediction.

REMINDER: The user must take note that HYDRODYNAMIC MODELING by any known
technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the
CORMIX predictions on dilutions and concentrations (with associated
plume geometries) are reliable for the majority of cases and are accurate
to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges
the design configuration as highly complex and uncertain for prediction.

ATTACHMENT C
CORMIX Diffuser Model – Thermal

CORMIX2 PREDICTION FILE:

```
                    CORMIX MIXING ZONE EXPERT SYSTEM
         Subsystem CORMIX2:  Multiport Diffuser Discharges
                       CORMIX Version 5.0GT
                    HYDRO2 Version 5.0.0.0 March 2007
------------------------------------------------------------------------------
------------------------------------------------------------------------------
CASE DESCRIPTION
 Site name/label:   Gerdau Ameristeel KY0072231
 Design case:       Outfall 001 Thermal
 FILE NAME:         C:\... Files\CORMIX 5.0_TEST\MyFiles\Gerdau thermal.prd
 Time stamp:        Wed Jun 10 13:49:03 2009

ENVIRONMENT PARAMETERS (metric units)
 Bounded section
 BS    =    500.00  AS    =   1760.00  QA    =    161.92  ICHREG= 1
 HA    =      3.52  HD    =      4.57
 UA    =     0.092  F     =     0.046 USTAR =0.7009E-02
 UW    =     2.000 UWSTAR=0.2198E-02
 Uniform density environment
 STRCND=  U         RHOAM =  997.0456

DIFFUSER DISCHARGE PARAMETERS (metric units)
 Diffuser type:     DITYPE= unidirectional_perpendicular
 BANK  =  LEFT      DISTB =      6.09  YB1   =      3.05  YB2   =      9.14
 LD    =      6.10  NOPEN =    3       SPAC  =      3.05
 D0    =     0.050  A0    =     0.002 H0    =      3.05  SUB0  =      1.52
 Nozzle/port arrangement:   unidirectional_without_fanning
 GAMMA =     90.00  THETA =      0.00  SIGMA =      0.00  BETA  =     90.00
 U0    =     0.751  Q0    =     0.004       =0.4425E-02
 RHO0  =  993.0346  DRHO0 =0.4011E+01  GP0   =0.3945E-01
 C0    =0.3780E+02  CUNITS=  deg.C
 IPOLL =  3         KS    =0.0000E+00  KD    =0.0000E+00

FLUX VARIABLES - PER UNIT DIFFUSER LENGTH (metric units)
 q0    =0.7254E-03  m0    =0.5450E-03  j0    =0.2862E-04  SIGNJ0=      1.0
 Associated 2-d length scales (meters)
 lQ=B  =     0.001 lM    =      0.58  lm    =      0.06
 lmp   =  99999.00  lbp   =  99999.00  la    =  99999.00

FLUX VARIABLES - ENTIRE DIFFUSER (metric units)
 Q0    =0.4425E-02  M0    =0.3324E-02  J0    =0.1746E-03
 Associated 3-d length scales (meters)
 LQ    =      0.04  LM    =      1.05  Lm    =      0.63  Lb    =      0.22
                                       Lmp   =  99999.00  Lbp   =  99999.00

NON-DIMENSIONAL PARAMETERS
 FR0   =    121.71  FRD0  =     16.91  R     =      8.17  PL    =    140.
 (slot)             (port/nozzle)

RECOMPUTED SOURCE CONDITIONS FOR RISER GROUPS:
 Properties of riser group with  1 ports/nozzles each:
 U0    =     0.751 D0    =     0.050 A0    =     0.002 THETA =      0.00
 FR0   =    121.71  FRD0  =     16.91  R     =      8.17
 (slot)             (riser group)
```

CORMIX2 PREDICTION FILE:

```
FLOW CLASSIFICATION
 22222222222222222222222222222222222222222
 2  Flow class (CORMIX2)      =    IMPU7  2
 2  Applicable layer depth HS =     4.57  2
 22222222222222222222222222222222222222222

MIXING ZONE / TOXIC DILUTION / REGION OF INTEREST PARAMETERS
 C0    =0.3780E+02  CUNITS=  deg.C
 NTOX  =  0
 NSTD  =  1         CSTD  =0.3170E+02
 REGMZ =  0
 XINT  =   5000.00  XMAX  =   5000.00

X-Y-Z COORDINATE SYSTEM:
    ORIGIN is located at the bottom and the diffuser mid-point:
         6.09 m  from the LEFT  bank/shore.
    X-axis points downstream, Y-axis points to left, Z-axis points upward.
NSTEP = 800 display intervals per module

NOTE on dilution/concentration values for this HEATED DISCHARGE (IPOLL=3):
   S  = hydrodynamic dilutions, include buoyancy (heat) loss effects, but
        provided plume has surface contact
   C  = corresponding temperature values (always in "degC"!),
        include heat loss, if any
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD201: DIFFUSER DISCHARGE MODULE

 Due to complex near-field motions:  EQUIVALENT SLOT DIFFUSER (2-D) GEOMETRY

 Profile definitions:
   BV = Gaussian 1/e (37%) half-width, in vertical plane normal to trajectory
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

       X        Y       Z        S       C       BV       BH
    0.00     0.00    3.05     1.0 0.378E+02   0.00     3.05

END OF MOD201: DIFFUSER DISCHARGE MODULE
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER

 In this laterally contracting zone the diffuser plume becomes VERTICALLY FULLY
  MIXED over the entire layer depth (HS =    4.57m).
   Full mixing is achieved after a plume distance of about five
   layer depths from the diffuser.

 Profile definitions:
   BV = layer depth (vertically mixed)
   BH = top-hat half-width, in horizontal plane normal to trajectory
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)
```

CORMIX2 PREDICTION FILE:

```
       X        Y       Z        S       C       BV       BH
     0.00     0.00    3.05     1.0 0.378E+02   0.00     3.05
** WATER QUALITY STANDARD OR CCC HAS BEEN FOUND **
 The pollutant concentration in the plume falls below water quality standard
   or CCC value of 0.317E+02 in the current prediction interval.
 This is the spatial extent of concentrations exceeding the water quality
   standard or CCC value.
     0.00     0.00    3.05    21.6 0.175E+01   0.01     3.05
     0.01     0.00    3.05    30.1 0.125E+01   0.01     3.05
     0.01     0.00    3.04    36.7 0.103E+01   0.02     3.05
.
.
.
     3.04     0.00    2.29   582.9 0.648E-01   4.56     3.03
     3.05     0.00    2.29   583.3 0.648E-01   4.56     3.03
     3.05     0.00    2.28   583.6 0.648E-01   4.57     3.03
 Cumulative travel time =          32.6947 sec
   Plume centerline may exhibit slight discontinuities in transition
     to subsequent far-field module.

END OF MOD271: ACCELERATION ZONE OF UNIDIRECTIONAL CO-FLOWING DIFFUSER
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
BEGIN MOD251: DIFFUSER PLUME IN CO-FLOW

 Phase 1: Vertically mixed, Phase 2: Re-stratified

-------------------------------------------------------------------------------
 Phase 2: The flow has RESTRATIFIED at the beginning of this zone.

 This flow region is INSIGNIFICANT in spatial extent and will be by-passed.

END OF MOD251: DIFFUSER PLUME IN CO-FLOW
-------------------------------------------------------------------------------
** End of NEAR-FIELD REGION (NFR) **
-------------------------------------------------------------------------------
BEGIN MOD241: BUOYANT AMBIENT SPREADING

 Profile definitions:
   BV = top-hat thickness, measured vertically
   BH = top-hat half-width, measured horizontally in y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic average (bulk) dilution
   C  = average (bulk) concentration (includes reaction effects, if any)

 Plume Stage 1 (not bank attached):
       X        Y       Z        S       C       BV       BH       ZU       ZL
     3.05     0.00    4.57   583.6 0.648E-01   4.57     3.07     4.57     0.00
     3.08     0.00    4.57   583.9 0.647E-01   4.56     3.08     4.57     0.01
     3.12     0.00    4.57   584.1 0.647E-01   4.56     3.08     4.57     0.01
.
.
.
    30.81     0.00    4.57   718.4 0.526E-01   2.84     6.09     4.57     1.73
    30.85     0.00    4.57   718.5 0.526E-01   2.84     6.09     4.57     1.73
    30.88     0.00    4.57   718.7 0.526E-01   2.83     6.10     4.57     1.74
 Cumulative travel time =         335.2152 sec
```

CORMIX2 PREDICTION FILE:

```
------------------------------------------------------------------------
 Plume is ATTACHED to LEFT  bank/shore.
   Plume width is now determined from LEFT  bank/shore.

 Plume Stage 2 (bank attached):
       X        Y       Z        S       C        BV       BH      ZU      ZL
     30.88     6.09    4.57   718.7 0.526E-01   2.83    12.19    4.57    1.74
     31.36     6.09    4.57   720.0 0.525E-01   2.83    12.23    4.57    1.74
     31.83     6.09    4.57   721.3 0.524E-01   2.83    12.28    4.57    1.74
.
.
.
    408.89     6.09    4.57  3468.0 0.109E-01   4.57    34.89    4.57    0.00
    409.36     6.09    4.57  3474.2 0.109E-01   4.57    34.92    4.57    0.00
    409.84     6.09    4.57  3480.4 0.109E-01   4.57    34.94    4.57    0.00
 Cumulative travel time =        4454.1870 sec

END OF MOD241: BUOYANT AMBIENT SPREADING
------------------------------------------------------------------------
 Due to the attachment or proximity of the plume tothe bottom, the bottom
   coordinate for the FAR-FIELD differs from the ambient depth, ZFB = 0 m.
 In a subsequent analysis set "depth at discharge" equal to "ambient depth".
------------------------------------------------------------------------
BEGIN MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT

  Vertical diffusivity (initial value)   = 0.647E-02 m^2/s
  Horizontal diffusivity (initial value) = 0.809E-02 m^2/s

 The passive diffusion plume is VERTICALLY FULLY MIXED at beginning of region.

 Profile definitions:
   BV = Gaussian s.d.*sqrt(pi/2) (46%) thickness, measured vertically
      = or equal to layer depth, if fully mixed
   BH = Gaussian s.d.*sqrt(pi/2) (46%) half-width,
        measured horizontally in Y-direction
   ZU = upper plume boundary (Z-coordinate)
   ZL = lower plume boundary (Z-coordinate)
   S  = hydrodynamic centerline dilution
   C  = centerline concentration (includes reaction effects, if any)

 Plume Stage 2 (bank attached):
       X        Y       Z        S       C        BV       BH      ZU      ZL
    409.84     6.09    4.57  3480.4 0.109E-01   4.57    34.94    4.57    0.00
    415.58     6.09    4.57  3482.6 0.109E-01   4.57    34.96    4.57    0.00
    421.31     6.09    4.57  3484.9 0.108E-01   4.57    34.98    4.57    0.00
.
.
.
   4988.57     6.09    4.57  4966.9 0.761E-02   4.57    49.86    4.57    0.00
   4994.31     6.09    4.57  4968.4 0.761E-02   4.57    49.88    4.57    0.00
   5000.04     6.09    4.57  4970.0 0.761E-02   4.57    49.89    4.57    0.00
 Cumulative travel time =       54345.8867 sec

 Simulation limit based on maximum specified distance =   5000.00 m.
   This is the REGION OF INTEREST limitation.

END OF MOD261: PASSIVE AMBIENT MIXING IN UNIFORM AMBIENT
------------------------------------------------------------------------
------------------------------------------------------------------------
CORMIX2: Multiport Diffuser Discharges       End of Prediction File
```

CORMIX2 SESSION REPORT:

```
                    CORMIX MIXING ZONE EXPERT SYSTEM
                        CORMIX Version 5.0GT
                     HYDRO2:Version  March,2007
SITE NAME/LABEL:                Gerdau Ameristeel KY0072231
  DESIGN CASE:                  Outfall 001 Thermal
  FILE NAME:                    C:\Program Files\CORMIX 5.0 TEST\MyFiles\Gerdau
thermal.prd
  Using subsystem CORMIX2:     Multiport Diffuser Discharges
  Start of session:             06/10/2009--13:49:03
*******************************************************************************
SUMMARY OF INPUT DATA:
-------------------------------------------------------------------------------
AMBIENT PARAMETERS:
  Cross-section                         = bounded
  Width                         BS      = 500 m
  Channel regularity            ICHREG = 1
  Ambient flowrate              QA      = 161.92 m^3/s
  Average depth                 HA      = 3.52 m
  Depth at discharge            HD      = 4.57 m
  Ambient velocity              UA      = 0.092 m/s
  Darcy-Weisbach friction factor F      = 0.0464
    Calculated from Manning's n         = 0.03
  Wind velocity                 UW      = 2 m/s
  Stratification Type           STRCND = U
  Surface temperature                   = 25 degC
  Bottom temperature                    = 25 degC
  Calculated FRESH-WATER DENSITY values:
  Surface density               RHOAS   = 997.0456 kg/m^3
  Bottom density                RHOAB   = 997.0456 kg/m^3
-------------------------------------------------------------------------------
DISCHARGE PARAMETERS:           Submerged Multiport Diffuser Discharge
  Diffuser type                 DITYPE = unidirectional perpendicular
  Diffuser length               LD      = 6.1 m
  Nearest bank                          = left
  Diffuser endpoints            YB1     = 3.05 m;    YB2 = 9.14 m
  Number of openings            NOPEN   = 3
  Number of Risers              NRISER = 3
  Ports/Nozzles per Riser       NPPERR  = 1
  Spacing between risers/openings SPAC  = 3.05 m
  Port/Nozzle diameter          D0      = 0.05 m
    with contraction ratio              = 1
  Equivalent slot width         B0      = 0.0010 m
  Total area of openings        TA0     = 0.0059 m^2
  Discharge velocity            U0      = 0.75 m/s
  Total discharge flowrate      Q0      = 0.004425 m^3/s
  Discharge port height         H0      = 3.05 m
  Nozzle arrangement            BETYPE = unidirectional without fanning
  Diffuser alignment angle      GAMMA   = 90 deg
  Vertical discharge angle      THETA   = 0 deg
  Actual Vertical discharge angle THEAC  = 0 deg
  Horizontal discharge angle    SIGMA   = 0 deg
  Relative orientation angle    BETA    = 90 deg
  Discharge temperature (freshwater)    = 37.80 degC
  Corresponding density         RHO0    = 993.0346 kg/m^3
  Density difference            DRHO    = 4.0110 kg/m^3
  Buoyant acceleration          GP0     = 0.0395 m/s^2
  Discharge concentration       C0      = 37.800000 deg.C
  Surface heat exchange coeff.  KS      = 0 m/s
  Coefficient of decay          KD      = 0 /s
```

CORMIX2 SESSION REPORT:

```
------------------------------------------------------------------------------
FLUX VARIABLES PER UNIT DIFFUSER LENGTH:
  Discharge (volume flux)         q0     = 0.000725 m^2/s
  Momentum flux                   m0     = 0.000545 m^3/s^2
  Buoyancy flux                   j0     = 0.000029 m^3/s^3
------------------------------------------------------------------------------
DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.00 m          Lm  = 0.06 m          LM  = 0.58 m
  lm' = 99999 m          Lb' = 99999 m          La  = 99999 m
  (These refer to the actual discharge/environment length scales.)
------------------------------------------------------------------------------
NON-DIMENSIONAL PARAMETERS:
Slot Froude number              FR0    = 121.71
  Port/nozzle Froude number       FRD0   = 16.91
  Velocity ratio                  R      = 8.17
------------------------------------------------------------------------------
MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                         = no
  Water quality standard specified        = yes
  Water quality standard          CSTD    = 31.700000 deg.C
  Regulatory mixing zone                  = no
  Region of interest                      = 5000 m downstream
******************************************************************************
HYDRODYNAMIC CLASSIFICATION:
  *-------------------------*
  | FLOW CLASS   = IMPU7 |
  *-------------------------*
  This flow configuration applies to a layer corresponding to the full water
  depth at the discharge site.
  Applicable layer depth = water depth = 4.57 m
******************************************************************************
MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):

------------------------------------------------------------------------------
X-Y-Z Coordinate system:
  Origin is located at the bottom below the port center:
    6.09 m from the left bank/shore.
  Number of display steps NSTEP = 800 per module.
------------------------------------------------------------------------------
NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no regulatory
  implication.  However, this information may be useful for the discharge
  designer because the mixing in the NFR is usually sensitive to the
  discharge design conditions.
  Pollutant concentration at NFR edge  c = 0.0648 deg.C
  Dilution at edge of NFR              s = 583.6
  NFR Location:                        x = 3.05 m
    (centerline coordinates)           y = 0 m
                                       z = 4.57 m
  NFR plume dimensions:  half-width (bh) = 3.03 m
                          thickness (bv) = 4.57 m
Cumulative travel time:       32.695 sec.
------------------------------------------------------------------------------
Buoyancy assessment:
  The effluent density is less than the surrounding ambient water
  density at the discharge level.
  Therefore, the effluent is POSITIVELY BUOYANT and will tend to rise towards
  the surface.
```

CORMIX2 SESSION REPORT:

```
------------------------------------------------------------------------------
Near-field instability behavior:
  The diffuser flow will experience instabilities with full vertical mixing
  in the near-field.
  There may be benthic impact of high pollutant concentrations.
------------------------------------------------------------------------------
FAR-FIELD MIXING SUMMARY:
  Plume is vertically fully mixed WITHIN NEAR-FIELD (or a fraction thereof),
  but RE-STRATIFIES LATER.
  Plume becomes vertically fully mixed again at 409.84 m downstream.
------------------------------------------------------------------------------
PLUME BANK CONTACT SUMMARY:
  Plume in bounded section contacts one bank only at 30.88 m downstream.
************************ TOXIC DILUTION ZONE SUMMARY ************************
No TDZ was specified for this simulation.
*********************** REGULATORY MIXING ZONE SUMMARY ***********************
No RMZ has been specified.
However:
The ambient water quality standard was encountered at the following
  plume position:
  Water quality standard                = 31.700000  deg.C
  Corresponding dilution              s = 1.2
  Plume location:                     x = 0.00 m
    (centerline coordinates)          y = 0 m
                                      z = 3.05 m
  Plume dimensions:      half-width (bh) = 3.05 m
                           thickness (bv) = 0.00 m
********************** FINAL DESIGN ADVICE AND COMMENTS **********************
CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent
  the actual three-dimensional diffuser geometry.  Thus, it approximates
  the details of the merging process of the individual jets from each
  port/nozzle.
In the present design, the spacing between adjacent ports/nozzles
  (or riser assemblies) is of the order of, or less than, the local
  water depth so that the slot diffuser approximation holds well.

Nevertheless, if this is a final design, the user is advised to use a
  final CORMIX1 (single port discharge) analysis, with discharge data
  for an individual diffuser jet/plume, in order to compare to
  the present near-field prediction.
------------------------------------------------------------------------------
REMINDER:  The user must take note that HYDRODYNAMIC MODELING by any known
  technique is NOT AN EXACT SCIENCE.
Extensive comparison with field and laboratory data has shown that the
  CORMIX predictions on dilutions and concentrations (with associated
  plume geometries) are reliable for the majority of cases and are accurate
  to within about +-50% (standard deviation).
As a further safeguard, CORMIX will not give predictions whenever it judges
  the design configuration as highly complex and uncertain for prediction.
```

KPDES

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

PERMIT NO.: KY0072231

AUTHORIZATION TO DISCHARGE UNDER THE KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to Authority in KRS 224,

Gerdau Ameristeel US Inc.
P.O. Box 468
Calvert City, Kentucky 42029

is authorized to discharge from a facility located at

Gerdau Ameristeel US Inc.
1035 Shar-Cal Road
Calvert City, Marshall County, Kentucky

to receiving waters named

Outfall 001 discharges to the Tennessee River at latitude 37°03′12″ longitude 88°23′51″. Outfall 002 is an internal outfall to 001.

Outfall 003 discharges to an unnamed tributary to Little Cypress Creek at latitude 37°02′52″ longitude 88°23′30″.

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in PARTS I, II, III, IV, and V. The permit consists of this cover sheet, and PART I 4 pages, PART II 1 page, PART III 2 pages, PART IV 3, and PART V 3 pages.

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight,

Date Signed

Sandra L. Gruzesky, Director
Division of Water

A1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 001 - Process, cooling (contact and non-contact), filter backwash, and sanitary (internal Outfall 002) wastewaters and stormwater runoff are treated in the settling clarifier prior to discharge.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS (lbs/day)		Other Units (Specify)		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	N/A	N/A	Report	Report	2/Month	Instantaneous
Hardness (as mg/l CaCO3)	N/A	N/A	Report	Report	2/Month	Grab
Total Suspended Solids	37.3	94.0	N/A	N/A	2/Month	Grab
Oil & Grease	N/A	20.4	N/A	N/A	2/Month	Grab
Temperature (^{o}F)	N/A	N/A	95	100	2/Month	Grab
Total Recoverable Metals (mg/l)	N/A	N/A	Report	Report	1/Quarter	Grab
Acute Toxicity (TUa)	N/A	N/A	N/A	5.19	1/Quarter	Grab

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/Month by Grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point prior to discharge to or mixing with the receiving waters or wastestreams from other outfalls.

The term Total Recoverable Metals means those metals listed on Form C, Section V, Part C – Metals, Cyanide, and Total Phenols: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc. Total Recoverable Metals shall be monitored once per quarter by grab sample. The results of the analyses shall be total and reported as a single concentration on the DMR. The laboratory bench sheets showing the results for each metal shall be attached to the DMR.

Acute Toxicity shall be monitored once per quarter by a minimum of two (2) grab samples collected over a 24-hour period as descriped in Part V of the Permit.

The abbreviation N/A means not applicable.

A2. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 002 – Internal monitoring point for the sanitary wastewaters prior to discharge through Outfall 001.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS (lbs/day)		Other Units (Specify)		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	N/A	N/A	Report	Report	1/Month	Instantaneous
BOD_5 (mg/l)	N/A	N/A	30	45	1/Month	Grab
Total Suspended Solids (mg/l)	N/A	N/A	30	45	1/Month	Grab
Fecal Coliform Bacteria	Removing from Permit					
Escherichia Coli (N/100 ml)	N/A	N/A	130	240	1/Month	Grab
Ammonia Nitrogen (as mg/l N)	N/A	N/A	20	30	1/Month	Grab
Dissolved Oxygen (mg/l) (minimum)	N/A	N/A	Not less than 2.0		1/Month	Grab

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/Month by Grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point prior to discharge to or mixing with the receiving waters or wastestreams from other outfalls.

The abbreviation N/A means Not Applicable.

The abbreviation BOD_5 means Biochemical Oxygen Demand (5-day).

The effluent limitations for BOD_5 and Total Suspended Solids are Monthly Averages and Weekly Averages.

The effluent limitations for *Escherichia Coli* are 30 day and 7 day Geometric Means.

A3. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 003 – No treatment of stormwater runoff.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS (lbs/day)		Other Units (Specify)		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	N/A	N/A	Report	Report	1/Month	Instantaneous
Precipitation (inches)	N/A	N/A	Report	Report	1/Month	Grab
Hardness (as mg/l $CaCO_3$)	N/A	N/A	Report	Report	1/Month	Grab
Total Suspended Solids (mg/l)	N/A	N/A	Report	Report	1/Month	Grab
Oil & Grease (mg/l)	N/A	N/A	Report	Report	1/Month	Grab
Total Recoverable Metals (mg/l)	N/A	N/A	Report	Report	1/Quarter	Grab

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/Month by Grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point prior to discharge to or mixing with the receiving waters or wastestreams from other outfalls.

The abbreviation N/A means Not Applicable.

The term Total Recoverable Metals means those metals listed on Form C, Section V, Part C – Metals, Cyanide, and Total Phenols: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc. Total Recoverable Metals shall be monitored once per discharge, but no more frequently than once per quarter, by grab sample. The results of the analyses shall be total and reported as a single concentration on the DMR. The laboratory bench sheets showing the results for each metal shall be attached to the DMR.

B. Schedule of Compliance

The permittee shall achieve compliance with all requirements on the effective date of this permit or as specified by the permit.

STANDARD CONDITIONS FOR KPDES PERMIT

The permittee is also advised that all KPDES permit conditions in KPDES Regulation 401 KAR 5:065, Section 1 will apply to all discharges authorized by this permit.

This permit has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal, and local agencies.

It is the responsibility of the permittee to demonstrate compliance with permit parameter limitations by utilization of sufficiently sensitive analytical methods.

PART III

OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained during each monitoring period must be reported on a preprinted Discharge Monitoring Report (DMR) Form that will be mailed to you. The completed DMR for each monitoring period must be sent to the Division of Water at the address listed below (with a copy to the appropriate Regional Office) postmarked no later than the 28th day of the month following the monitoring period for which monitoring results were obtained.

Division of Water
Paducah Regional Office
130 Eagle Nest Drive
Paducah, Kentucky 42003
ATTN: Supervisor

Energy & Environment Cabinet
Dept. for Environmental Protection
Division of Water/SWP Branch
200 Fair Oaks Lane
Frankfort, Kentucky 40601

B. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under 401 KAR 5:050 through 5:086, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

2. Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

C. Cooling Water Additives, FIFRA, and Mollusk Control

The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in cooling water which ultimately may be released to the waters of the Commonwealth is prohibited, except Herbicides, unless specifically identified and authorized by the KPDES permit. In the event the permittee needs to use a biocide or chemical not previously reported for mollusk control or other purpose, the permittee shall submit sufficient information, a minimum of thirty (30) days prior to the commencement of use of said biocides or chemicals, to the Division of Water for review and establishment of appropriate control parameters. Such information requirements shall include:

1. Name and general composition of biocide or chemical,
2. Any and all aquatic organism toxicity data,
3. Quantities to be used,
4. Frequencies of use,
5. Proposed discharge concentrations, and
6. EPA registration number, if applicable.

D. Outfall Signage

The permittee shall post a permanent marker at all discharge locations and/or monitoring points. The marker shall be at least 2 feet by 2 feet in size and a minimum of 3 feet above ground level with the Permittee Name and KPDES permit and outfall numbers in 2 inch letters. For internal monitoring points the marker shall be of sufficient size to include the outfall number in 2 inch letters and shall be posted as near as possible to the actual sampling location.

E Mixing Zone

The assigned mixing zones for the discharge at Outfall 001 shall have the following dimensions:

Toxicity:

Linear Distance from Point of Discharge:	0.033 feet in any direction
Maximum Surface Area Involved:	8.56×10^{-4} square feet
Volume of Receiving Water:	500 cfs (323 MGD)

Temperature:

Linear Distance from Point of Discharge:	0.0056 feet in any direction
Maximum Surface Area Involved:	2.47×10^{-5} square feet
Volume of Receiving Water:	500 cfs (323 MGD)

PART IV

BEST MANAGEMENT PRACTICES

SECTION A. GENERAL CONDITIONS

1. Applicability

These conditions apply to all permittees who use, manufacture, store, handle, or discharge any pollutant listed as: (1) toxic under Section 307(a)(1) of the Clean Water Act; (2) oil, as defined in Section 311(a)(1) of the Act; (3) any pollutant listed as hazardous under Section 311 of the Act; or (4) is defined as a pollutant pursuant to KRS 224.01-010(35) and who have ancillary manufacturing operations which could result in (1) the release of a hazardous substance, pollutant, or contaminant, or (2) an environmental emergency, as defined in KRS 224.01-400, as amended, or any regulation promulgated pursuant thereto (hereinafter, the "BMP pollutants"). These operations include material storage areas; plant site runoff; in-plant transfer, process and material handling areas; loading and unloading operations, and sludge and waste disposal areas.

2. BMP Plan

The permittee shall develop and implement a Best Management Practices (BMP) plan consistent with 401 KAR 5:065, Section 2(10) pursuant to KRS 224.70-110, which prevents or minimizes the potential for the release of "BMP pollutants" from ancillary activities through plant site runoff; spillage or leaks, sludge or waste disposal; or drainage from raw material storage. A Best Management Practices (BMP) plan will be prepared by the permittee unless the permittee can demonstrate through the submission of a BMP outline that the elements and intent of the BMP have been fulfilled through the use of existing plans such as the Spill Prevention Control and Countermeasure (SPCC) plans, contingency plans, and other applicable documents.

3. Implementation

If this is the first time for the BMP requirement, then the plan shall be developed and submitted to the Division of Water within 90 days of the effective date of the permit. Implementation shall be within 180 days of that submission. For permit renewals the plan in effect at the time of permit reissuance shall remain in effect. Modifications to the plan as a result of ineffectiveness or plan changes to the facility shall be submitted to the Division of Water and implemented as soon as possible.

4. General Requirements

The BMP plan shall:

a. Be documented in narrative form, and shall include any necessary plot plans, drawings, or maps.

b. Establish specific objectives for the control of toxic and hazardous pollutants.

(1) Each facility component or system shall be examined for its potential for causing a release of "BMP pollutants" due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.

(2) Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances which could result in a release of "BMP pollutants," the plan should include a prediction of the direction, rate of flow, and total quantity of the pollutants which could be released from the facility as result of each condition or circumstance.

c. Establish specific Best Management Practices to meet the objectives identified under paragraph b of this section, addressing each component or system capable of causing a release of "BMP pollutants."

d. Include any special conditions established in part b of this section.

e. Be reviewed by plant engineering staff and the plant manager.

5. Specific Requirements

The plan shall be consistent with the general guidance contained in the publication entitled "NPDES Best Management Practices Guidance Document," and shall include the following baseline BMPs as a minimum.

a. BMP Committee
b. Reporting of BMP Incidents
c. Risk Identification and Assessment
d. Employee Training
e. Inspections and Records
f. Preventive Maintenance
g. Good Housekeeping
h. Materials Compatibility
i. Security
j. Materials Inventory

6. SPCC Plans

The BMP plan may reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under Section 311 of the Act and 40 CFR Part 151, and may incorporate any part of such plans into the BMP plan by reference.

7. Hazardous Waste Management

The permittee shall assure the proper management of solid and hazardous waste in accordance with the regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1978 (RCRA) (40 U.S.C. 6901 et seq.) Management practices required under RCRA regulations shall be referenced in the BMP plan.

8. Documentation

The permittee shall maintain a description of the BMP plan at the facility and shall make the plan available upon request to NREPC personnel. Initial copies and modifications thereof shall be sent to the following addresses when required by Section 3:

Division of Water
Paducah Regional Office
130 Eagle Nest Drive
Paducah, Kentucky 42003
ATTN: Supervisor

Energy & Environment Cabinet
Dept. for Environmental Protection
Division of Water/SWP Branch
200 Fair Oaks Lane
Frankfort, Kentucky 40601

9. BMP Plan Modification

The permittee shall amend the BMP plan whenever there is a change in the facility or change in the operation of the facility which materially increases the potential for the ancillary activities to result in the release of "BMP pollutants."

10. Modification for Ineffectiveness

If the BMP plan proves to be ineffective in achieving the general objective of preventing the release of "BMP pollutants," then the specific objectives and requirements under paragraphs b and c of Section 4, the permit, and/or the BMP plan shall be subject to modification to incorporate revised BMP requirements. If at any time following the issuance of this permit the BMP plan is found to be inadequate pursuant to a state or federal site inspection or plan review, the plan shall be modified to incorporate such changes necessary to resolve the concerns.

SECTION B. SPECIFIC CONDITIONS

Periodically Discharged Wastewaters Not Specifically Covered By Effluent Conditions

The permittee shall include in this BMP plan procedures and controls necessary for the handling of periodically discharged wastewaters such as intake screen backwash, meter calibration, fire protection, hydrostatic testing water, water associated with demolition projects, etc.

PART V

BIOMONITORING – Acute CONCERNS

In accordance with PART I of this permit, the permittee shall initiate, within 30 days of the effective date of this permit, or continue the series of tests described below to evaluate wastewater toxicity of the discharge from Outfall 001.

TEST REQUIREMENTS

The permittee shall perform a 48-hour static non-renewal toxicity test with water flea (Ceriodaphnia dubia) and a 48-hour static non-renewal toxicity test with fathead minnow (Pimephales promelas). Tests shall be conducted on each of two grab samples taken over a 24-hour period approximately 12 hours apart (e.g. discrete sample #1 taken at 9:00 a.m., sample #2 taken at 9:00 p.m.). In addition to use of a control, effluent concentrations for the tests must include the permitted limit, (i.e., 16.92% effluent) and at least four additional effluent concentrations. For a permit limit of 100% effluent, test concentrations shall be 20%, 40%, 60%, 80% and 100%. If the permit limit is less than 100% effluent and greater than or equal to 75% effluent, the test concentrations shall include the permitted limit, two concentrations below the limit that are based on a 0.5 dilution factor, and two concentrations above the limit (to include 100% and mid-point between the permit limit and 100%). If the permit limit is less than 75% effluent, test concentrations shall include the permit limit concentration, two concentrations below the limit based on a 0.5 dilution factor, and two concentrations above the limit based on a 0.5 dilution factor if possible, otherwise to include 100% and mid-point between the permit limit and 100% . Selection of different effluent concentrations must be approved by the Division prior to testing. Testing of the effluent shall be initiated within 36 hours of each sample collection. Controls shall be conducted concurrently with effluent testing using synthetic water. The analysis will be deemed reasonable and good only if control survival is 90% or greater in test organisms held in synthetic water. Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period (i.e. monthly or quarterly). Noncompliance with the toxicity limit will be demonstrated if the LC_{50} is less than 16.92% effluent.

Tests shall be conducted on both species at the frequency specified in PART I of this permit.

If after at least six consecutive toxicity tests it can be determined that Ceriodaphnia dubia or the fathead minnow is more sensitive and all tests have passed, a request for testing with only the most sensitive species can be submitted to the Division. Upon approval, that most sensitive species may be considered as representative and all subsequent compliance tests can be conducted using only that species unless directed at any time by the Division to change or revert to both.

REPORTING REQUIREMENTS

Results of all toxicity tests conducted with any species shall be reported according to the most recent format provided by the Division of Water. Notification of failed test shall be made to the Division's Water Quality Branch within five days of test completion. Test reports shall be submitted to the Division's Water Quality Branch within thirty (30) days of completion.

PART V – BIOMONITORING - ACUTE CONCERNS

ACUTE TOXICITY

If noncompliance with the toxicity limit occurs in an initial test, (i.e., the LC_{50} for either species in either grab sample is less than 16.92% effluent), the permittee must repeat the test using new grab samples collected approximately 12 hours apart. Sampling must be initiated within 10 days of completing the failed test. The second round of testing shall include both species unless approved for only the most sensitive species by the Division. Results of the second round of testing will be used to evaluate the persistence of the toxic event and the possible need for a Toxicity Reduction Evaluation (TRE).

If the second round of testing also demonstrates noncompliance with the toxicity limit, the permittee will be required to perform accelerated testing as specified in the following paragraphs.

Complete four additional rounds of testing to evaluate the frequency and degree of toxicity within 60 days of completing the second failed round of testing. Results of the initial and second rounds of testing specified above plus the four additional rounds of testing will be used in deciding if a TRE shall be required.

If results from any two of six rounds of testing show a significant noncompliance with the acute limit, (i.e., $\geq$1.2 times the TU_a), or results from any four of the six tests show acute toxicity (as defined in 1.A), a TRE will be required.

The permittee shall provide written notification to the Division of Water within five (5) days of completing the accelerated testing, stating that: (1) toxicity persisted and that a TRE will be initiated; or (2) that toxicity did not persist and normal testing will resume.

Should toxicity prove not to be persistent during the accelerated testing period, but reoccur within 12 months of the initial failure at a level • 1.2 times the TU_a, then a TRE shall be required.

TOXICITY REDUCTION EVALUATION (TRE)

Having determined that a TRE is required, the permittee shall initiate and/or continue at least monthly testing with both species until such time as a specific TRE plan is approved by the Division. A TRE plan shall be developed by the permittee and submitted to the Division within thirty days of determining a TRE is required. The plan shall be developed in accordance with the most recent EPA and Division guidance. Questions regarding this process may be submitted to the Division's Water Quality Branch.

The TRE plan shall include Toxic Identification Evaluation (TIE) procedures, treatability studies, and evaluations of: chemical usage including changes in types, handling and suppliers; operational and process procedures; housekeeping and maintenance activities; and raw materials. The TRE plan will establish an implementation schedule to begin immediately upon approval by the Division, to have duration of at least six months, and not to exceed 24 months. The implementation schedule shall include quarterly progress reports being submitted to the Division's Water Quality Branch, due the last day of the month following each calendar quarter.

PART V – BIOMONITORING - ACUTE CONCERNS

TOXICITY REDUCTION EVALUATION (TRE)

Upon completion of the TRE, the permittee shall submit a final report detailing the findings of the TRE and actions taken or to be taken to prevent the reoccurrence of toxicity. This final report shall include: the toxicant(s), if any are identified; treatment options; operational changes; and the proposed resolutions including an implementation schedule not to exceed 180 days.

Should the permittee determine the toxicant(s) and/or a workable treatment prior to the planned conclusion of the TRE, the permittee will notify the Division's Water Quality Branch within five days of making that determination and take appropriate actions to implement the solution within 180 days of that notification.

TEST METHODS

All test organisms, procedures, and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, EPA-821-R-02-012 (5th edition), the most recently published edition of this publication, or as approved in advance by the Division of Water.

Toxicity testing for compliance to KPDES discharge limits shall be performed by a laboratory approved by the Division of Water to conduct the required toxicity tests. Within each toxicity report to the Division, the permittee must demonstrate successful performance of reference toxicant testing by the laboratory that conducts their effluent toxicity tests. Within 30 days prior to initiating an effluent toxicity test, a reference toxicant test must be completed for the method used; alternatively, the reference toxicant test may be run concurrent with the effluent toxicity test. In addition, for each test method, at least 5 acceptable reference toxicant tests must be completed by the laboratory prior to performing the effluent toxicity test. A control chart including the most recent reference toxicant test endpoints for the effluent test method (minimum of 5, up to 20 if available) shall be part of the report.